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Assistant Commissioner for Patents
Washington, D. C. 20231

Docket No.: P48-1229-1

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Christina A. Nahmias

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Assistant Commissioner for Patents
Washington, D. C. 20231

FILING UNDER 37 C.F.R. 1.53(b)

This is a request for filing a

Continuation

X Divisional

application under 37 C.F.R. 1.53(b), of pending prior application Serial

No. 09/271,416 filed on March 17, 1999 of Strobel et al.

for METHOD FOR MAKING DIE BOARDS, AND MATERIALS AND APPARATUS FOR
PRACTICING THE METHOD

Copy of Prior Application as Filed Which is Attached

X I hereby verify that the attached papers are a true copy of
what is shown in my records to be the above identified prior
application, including the oath or declaration originally
filed (37 C.F.R. 1.53(b))

The copy of the papers of prior application as filed which are
attached are as follows:

9 page(s) of specification
7 page(s) of claims
1 page(s) of abstract
 sheet(s) of drawing(s)
3 page(s) of declaration and power of attorney
2 page(s) of preliminary amendment filed with prior application

If the copy of the declaration being filed does not show applicant's
signature indicate thereon that it was signed and complete the following:

 in accordance with the indication required by 37 C.F.R. 53(b)
my records reflect that the original signed declaration showing
applicant's signature was filed on
 the amendment referred to in the declaration filed to complete
the prior application and I hereby state, in accordance with
the requirements of 37 C.F.R. 1.53(b), that this amendment did
not introduce new matter therein.

2. Amendments

X Cancel in this application original claims 1-29
of the prior application before calculating the filing fee
X A preliminary amendment is enclosed. (Claims added by this
amendment have been properly numbered consecutively
beginning with the number next following the highest
numbered original claim in the prior application.)

3. Fee Calculation

	Small Entity	Large Entity
Basic Fee	\$345.00	\$690.00
Total Claims: <u>4</u> - 20 = <u>0</u> (Small \$9.00 Large \$18.00)		
Independent Claims: <u>1</u> - 3 = <u>0</u> (Small \$39.00 Large \$78.00)		
Multiple dependent claims: _____ = _____ (Small \$130.00 Large \$260.00)		
Total		\$ <u>690.00</u>

_____ Fee for extra claims is not being paid at this time.

Small Entity Status

_____ a verified statement that this filing is by a small entity is:
_____ attached
_____ filed in the parent application and such status is still proper and desired (37 C.F.R. 1.28(a))

Drawings

_____ Transfer the drawings from the prior application to this application and, subject to item 13 below, abandon said prior application as of the filing date accorded this application. A duplicate copy of this request is enclosed for filing in the prior application file. (may only be used if signed by (1) applicant (2) assignee of record or (3) attorney or agent of record authorized by 37 C.F.R. 1.138 and before payment of issue fee).

_____ Transfer the following sheet(s) of drawing from the prior application to this application _____

X New drawings are enclosed.

_____ formal

X informal

6. Priority - 35 U.S.C. 119

_____ Priority of application Serial No. _____ filed on _____ in _____ is claimed under 35 U.S.C. 119.

_____ The certified copy has been filed in prior application Serial No. _____ filed on _____

7. Relate Back - 35/U.S.C. 120

X Amend the specification by inserting before the first line the sentence:

This is a _____ continuation

X divisional

application of pending U.S. Application Serial No. 09/271,416 filed on March 17, 1999

8. Assignment

X The prior application is assigned of record to Gerber Scientific Products, Inc.
Assignment recorded in Patent and Trademark Office on June 7, 1999
Reel 010006 Frame 0974

X An assignment of the invention to Gerber Scientific Products, Inc. is attached.

9. Fee Payment Being Made At This Time

Not enclosed

_____ No filing fee is submitted. This and the surcharge required by 37 C.F.R. 1.16(e) can be paid subsequently.

Enclosed

<input checked="" type="checkbox"/> basic filing fee	\$ 690.00
<input type="checkbox"/> recording assignment (\$40.00; 37 C.F.R. 1.21 (h)(i))	\$ _____
<input type="checkbox"/> processing and retention fee (\$130.00; 37 C.F.R. 1.53(d) and 1.21(1))	\$ _____
Total fees enclosed	\$ 690.00

10. Method Of Payment Of Fees

☒ Enclosed is a check in the amount of \$ 690.00
_____ Charge Account No. 13-0235 in the amount of \$ _____
A duplicate of this request is attached.

11. Authorization to Charge Additional Fees

☒ The Commissioner is hereby authorized to charge the following additional fees which may be required to Account No. 13-0235.
☒ 37 C.F.R. 1.16 (filing fees)
☒ 37 C.F.R. 1.16 (presentation of extra claims)
☒ 37 C.F.R. 1.17 (application processing fees)

12. Power of Attorney

☒ The power of attorney in the prior application is to _____
McCormick, Paulding & Huber LLP
☒ the power appears in the original papers in the prior application.
_____ since the power does not appear in the original papers, a copy of the power in the prior application is enclosed.
_____ a new power has been executed and is attached.
☒ address all future communications to: Richard R. Michaud
McCormick, Paulding & Huber LLP, CityPlace II, 185 Asylum Street,
Hartford, Connecticut 06103-3402

13. Maintenance of Copendency of Prior Application

_____ A petition, fee and response has been filed to extend the term in the pending prior application until _____
_____ Please abandon the prior application when the petition for extension of time in that application is granted and when this application is granted a filing date so as to make this application copending with said prior application.
☒ Please maintain the prior application so as to make this application copending with said prior application.

14. Conditional Petition for Extension of Time in Parent Application.

_____ A conditional petition for extension of time is being filed in the pending parent application.

Respectfully submitted,

By Richard R. Michaud
Richard R. Michaud
Registration No. 40,088
Attorney for Applicants

Date April 26, 2000
/can

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Christina A. Nahmias

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of)

Strobel et al.)

on METHOD FOR MAKING DIE BOARDS)

AND MATERIALS AND APPARATUS FOR)

PRACTICING THE METHOD)

Serial No.: NEW) (Our Docket No. P48-1229-1)

Filed: Herewith)

Hartford, Connecticut, April 26, 2000

Assistant Commissioner for Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

S I R:

Please amend the above-referenced divisional application as follows:

In the specification:

Page 1, Line 5, after "METHOD FOR MAKING DIE BOARDS, AND
MATERIALS AND APPARATUS FOR PRACTICING THE METHOD ", please insert

--CROSS REFERENCE TO RELATED APPLICATION--.

This application is a divisional of United States Patent Application Serial No. 09/271,416 entitled METHOD FOR MAKING DIE BOARDS, AND MATERIALS AND APPARATUS FOR PRACTICING THE METHOD, filed on March 17, 1999.

In the claims:

Please cancel claims 1-29.

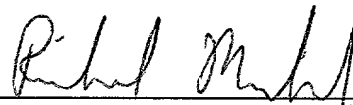
REMARKS

The specification of the above-identified divisional application has been amended to insert a cross reference to a related co-pending parent application. In addition, claims 1-29 have been canceled. No new matter has been added.

Applicants believe no fees are due with the filing of this Preliminary Amendment. However, please charge any deficiency in fees associated with this filing to our Deposit Account No. 13-0235. Should the Examiner have any questions, Applicants respectfully request that the Examiner contact the Applicants' representative at the phone number listed below.

Respectfully submitted,

By



Richard R. Michaud
Registration No. 40,088
Attorney for Applicants

McCormick, Paulding & Huber LLP
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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on the date indicated below.

Richard Michael
Attorney for Applicant

9/3/99
Date of Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of)
Strobel et al.)
on METHOD FOR MAKING DIE BOARDS,) Group Art Unit: 1733
AND MATERIALS AND APPARATUS FOR)
PRACTICING THE METHOD)
Serial No.: 09/271,416) (Our Docket No. P48-1229)
Filed: March 17, 1999)

Hartford, Connecticut, September 3, 1999

Assistant Commissioner for Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

S I R:

Please amend the above-identified application as follows:

In the Claims:

Please add the following new claims:

-- 30. A rotary cutting tool for generating slots in die boards

comprising:

an upper cutting portion defining a first outer diameter and a lower cutting portion defining a second outer diameter extending from and coaxial with said first cutting portion; and wherein

said second cutting portion defines a generally cylindrical, outer peripheral surface. --

-- 31. A rotary cutting tool as defined by claim 30 wherein said first cutting portion defines a tapered section having a diameter that progressively decreases from said first outer diameter to said second outer diameter. --

-- 32. A rotary cutting tool as defined by claim 30 wherein said first and second cutting sections are each generally cylindrical. --

-- 33. A rotary cutting tool as defined by claim 30 wherein each of said first and second cutting sections are defined in part by at least two flutes spaced symmetrically thereabout, each of said flutes defining a cutting edge. --

REMARKS

This preliminary amendment adds new claims 30-33 to the above referenced application. Support for these claims can be found in the specification on page 8 at lines 18-40, and in Figs. 9 and 10 of the originally filed application. Accordingly no new matter has been added.

Should any matter remain unresolved after the entry of this Amendment, the Applicants respectfully request the Examiner to contact the Applicants' representative at the phone number listed below. Applicants believe no fees are due with the filing of this amendment; however, please charge any deficiencies in fees that are associated with filing this amendment to our Deposit Account No. 13-0235.

Respectfully submitted,

By Richard R. Michaud

Richard R. Michaud
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Christina Nahmias
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**Method For Making Die Boards, And Materials And Apparatus For
 Practicing The Method**

Field Of The Invention

The present invention is generally directed to die boards for use in cutting and creasing sheet-type work materials, and is more specifically directed to a method for fabricating a die board using a rotary cutting tool, and to the materials used in said fabrication.

Background of the Invention

Die boards are generally used to cut and/or crease one or more layers of sheet-type work material, such as cardboard, for use in the manufacture of various different articles. One such use, given here by way of example and not to be construed as limiting the present invention, is the fabrication of box and package blanks which after having been cut and creased by the die board, can be folded into finished boxes or product packages.

Usually, the die board consists of a base made from a thick piece of material such as plywood, that has a series of slots cut into it. These slots are arranged in a pattern corresponding, for example, to the outer periphery of a box or package blank, and the lines along which the blank must be folded to create the finished box or package. Rules, which generally consist of pieces of steel cut to lengths and/or bent to correspond to the slot length and configurations in the base, are then inserted into and protrude from the slots. The amount by which a particular rule extends from the slot depends on whether the rule will be employed to cut or crease the sheet material. Generally, during a cutting and creasing operation, the sheet material is positioned under the die board and pressure is applied to the board via a press, causing the rules to engage the sheet material, thereby cutting and creasing the sheet material.

In known methods of fabricating die boards, difficulties are often associated with the formation of the slots that must be cut into the die board base to

accommodate the rules. Typically these slots are cut into the base in one of two ways; (1) using lasers, or (2) using a jig or band saw. The capital cost of a laser is generally very high, in addition, the use of lasers tends to be expensive and complex. Large amounts of power is required to operate the laser, and the beam must typically be shielded using an inert gas. Another difficulty associated with using lasers is that the slots produced tend to have scalloped edges. When the rules are inserted into these slots, rather than having line contact between the slot edges and the rules; the rules engage the slot edges at discrete points corresponding to the "peaks" of the scalloped edge. This reduces the stability of the rule in the die-board, increasing the potential for inaccurate cutting and creasing when the die board is used. This problem is further exacerbated due to the fact that the heat associated with the laser tends to dry out the board resulting in dimensional distortion of the slots being cut and warping of the board. A further problem also attributable to the heat of the laser is that smoke is generated from the material being cut. The smoke causes environmental problems which must be addressed, resulting in further increases in operating expense.

When a jig or band saw is employed, a starting hole must be drilled at one end of the slot to facilitate insertion of the blade associated with the saw. This requires an additional operation, thereby adding to the cost associated with fabricating the die board. Furthermore, these slots are often cut by hand with the inaccuracies resulting from human error making it difficult to insert the die board rules into the slots. The potential human error can also result in inaccurate die cutting. In addition, when using a manual process, the cut lines must be transferred by hand onto the die board.

Based on the foregoing, it is the general object of the present invention to provide a die board and a method for manufacturing the die board that overcomes the difficulties and drawbacks associated with prior art die boards and their manufacture.

It is a more specific object of the present invention to provide a die board fabricated using rotary cutting tools that is not subject to the above-described inaccuracies.

Summary Of The Present Invention

The present invention is directed to a die board for cutting and/or creasing sheet-type work material that includes a die board base having a first upper surface and a second lower surface. At least one slot extends along the upper surface and through the thickness of the die board base. The slot has a first slot section extending from the first upper surface at least part-way through the die board and having a first slot width at the first upper surface. The slot also includes a second slot section extending from the second lower surface at least part-way through the

die board's thickness and having a second slot width. Preferably, the second slot width is smaller than the first slot width and is adapted to receive and grippingly retain a die board rule. However, the present invention is not limited in this regard as the widths of the first and second slots can also be equal.

5 In one embodiment of the present invention the die board base is a laminate that includes a first layer of die board material and at least a second layer of die board material. The first layer of die board material includes a third lower surface bonded via an adhesive to a fourth upper surface defined by the second layer. The above-described slot configuration is employed in this embodiment with
10 the second slot section extending through the second layer of die board material. However, the present invention is not limited in this regard as the first slot section can extend through the first and into the second layer of die board material without departing from the broader aspects of the present invention.

15 Preferably, the second slot section extends through the second layer of die board material, part-way into the first layer of die board material. It is also preferable that the third lower surface of the first layer of die board material have such release characteristics relative to the fourth upper surface of the second layer of die board material that the second layer can be separated from the first layer. In this manner, the adhesive remains bonded to the second layer of die board material,
20 leaving the first layer virtually free of adhesive. Once the second layer of die board material has been separated from the first layer, it can then be attached to the first upper surface, such that the slots in the first and second layers are aligned. Accordingly, when the die board rules are inserted into the die board, the rules are grippingly retained by the slots in the second layer of die board material, as well as
25 by the second slot sections in the first layer of die board material. Retaining the rules at the upper and lower surfaces of the die board has the advantage of increasing the stability of the rule during operation such that rule deflection is minimized.

30 While the die board has been described above as including first and second layers of die board material, the present invention is not limited in this regard, as any number of layers of die board material can be stacked one-on-top-of-the-other. Moreover, the configuration of the slots can be the same for each layer of die board material, or it can vary. For example, a three layer die board construction can be employed where each slot in each layer includes the above-described first and
35 second slot sections. Conversely, the first and third layers could include only the second slot sections which are adapted to grippingly retain the die board rules, while the second layer of die board material includes only the first slot section that is wider than the second slot section.

40 The present invention also resides in a method for fabricating a die board wherein a die board base is provided having a first upper surface and a second

lower surface. An apparatus, such as, but not limited to a milling machine or router, is also provided to cut the slots in the die board base and utilizes at least one rotary cutting tool. During the die board fabrication process, the die board base is presented to the apparatus which is operated to cause the cutting tool or tools to engage the base. The slots for receiving the die board rules are cut such that each slot includes an upper slot section having a first width, and a lower slot section having a second width that is less than the first width and sized to grippingly retain at least one die board rule therein.

More than one rotary cutting tool can be used to cut the slots into the die board base, however, the present invention is not limited in this regard. For example, a single stepped cutter having an upper cutting portion defining a diameter corresponding to the upper slot width, and a lower tip portion having a diameter corresponding to the second slot width could be used. The cutter could also employ a tapered transition region between the upper cutting portion and the tip portion. While rotary cutting tools have been described, the present invention is not limited in this regard as other cutting methods such as sawing, employing a laser, or using a high-pressure water jet can also be utilized without departing from the broader aspects of the present invention.

The die board base fabricated using the above-described method can also be a laminate comprised of two or more layers of die board material bonded together. In this case, the method would include the steps of cutting the slots into each layer either simultaneously, or one-at-a-time, and then assembling the respective layers, preferably by bonding the layers of die board material together.

Brief Description Of The Drawings

FIG. 1 is a perspective view of an embodiment of the die board of the present invention;

FIG. 2 is an enlarged front view of a slot cut into the die board of FIG. 1 showing an upper slot section filled with a filler material for preventing deflection during operation of a die board rule positioned in the slot;

FIG. 3 is an enlarged front view of a slot cut into the die board of FIG. 1 showing an upper slot having spacers located therein for preventing deflection during operation of a die board rule positioned in the slot;

FIG. 4 is a perspective view of an embodiment of the die board of the present invention wherein the die board base is comprised of a laminate having first and second layers of die board material;

FIG. 5 is a perspective view of the die board of FIG. 4 showing the second layer of die board material positioned on an upper surface of the first layer of die board material;

FIG. 6 is a perspective view of an embodiment of the die board of the present invention showing a laminated die board base comprised of three layers of die board material;

FIG. 7 is a perspective view of an embodiment of the die board of the present invention;

FIG. 8 is an enlarged partially cross sectional view of a slot in the die board base cut using two rotary cutters;

FIG. 9 is an enlarged partially cross sectional view of a slot in the die board base cut using a single rotary cutter; and

FIG. 10 is an enlarged partially cross sectional view of a slot in the die board base cut using a single rotary cutter.

Detailed Description Of The Preferred Embodiments

As shown in FIG. 1, an embodiment of the die board for cutting and or creasing sheet type work material, of the present invention is generally designated by the reference number 10 and is useful in cutting package blanks from sheet type work material. The die board includes a die board base 12 made from a suitable material, such as, but not limited to wood, or plastic, and has a first upper surface 13 and a second lower surface 14. In addition, the die board base 12 includes one or more slots 16 extending through the thickness of the die board base, and arranged in a predetermined pattern corresponding to the shape of a blank to be cut using the die board.

The slots 16 include a first slot section 18 extending from the first upper surface 13 part way through the thickness of the die board base and defining a first width labeled "w1". A second slot section 20 extends from the first slot section 18 to the second lower surface 14, and defines a second slot width labeled "w2" that is smaller than the first slot width. A die board rule 22 is positioned in each slot 16, and defines an edge portion 24 that is pressed into the second slot section 20 such that the die board rule is grippingly retained therein. The die board rule 22 also defines a tip portion 26 projecting outwardly from the first upper surface 12 and adapted to engage and cut or crease the work material. However, the present invention is not limited in this regard as the tip portion 26 of the die board rule can also extend from the second lower surface without departing from the broader aspects of the present invention. While the die board 10 shows only two slots 16 and two die board rules 22, the present invention is not limited in this regard as any number of slots and die board rules arranged in an infinite number of patterns can be employed without departing from the broader aspects of the present invention. In addition, the die board 10 includes bridges 23 defined by the die board base, that extend between in inner and outer periphery determined by the configuration of the blank being cut and/or creased by the die board. The bridges 23 extend through

gaps 25 in the die board rules 22 and prevent the die board from having any unsupported areal sections that could potentially separate from the die board base during operation. While the widths w_1 and w_2 have been shown and described as being different, the present invention is not limited in this regard as w_1 can

5 approximately equal w_2 without departing from the broader aspects of the present invention.

As shown in FIG. 2, cavities 28 are formed between the die board rule 22 and the side walls 30 that define the first slot section 18. The cavities 30 are filled with a suitable filler material, such as, but not limited to epoxy, to prevent the die

10 board rules from deflecting during operation of the die board 10. Alternatively, and as shown in FIG. 3, the spacers 32 can be positioned in the cavities 28 engaging the side walls 30 and the die board rule 22, thereby securing the die board rule in the slot 16.

A second embodiment of the die board of the present invention, shown in FIG. 4, is generally designated by the reference numeral 110. The die

15 board 110 is similar in many respects to the die board 10 described above, and therefore like reference numerals preceded by the number 1 are used to indicate like elements. The die board 110 differs from the die board 10 in that the die board base 112 is a laminate having first and second layers of die board material, 134 and 136 respectively. The first layer of die board material 134 includes a third lower surface

20 138 bonded to a fourth upper surface 140, defined by the second layer of die board material 136 via a layer of adhesive (not shown). The adhesive can be any one of a number of different thermoset or thermoplastic adhesives, such as epoxies, or the adhesive can be of the pressure sensitive type.

Still referring to FIG. 4, the slots 116 are the same as described above with reference to the die board 10. In this instance the second slot section 120 extends through the second layer of die board material 136 and part-way into the first layer of die board material 134. However, the present invention is not limited

25 in this regard as the second slot section could extend only through the second layer of die board material 136.

One of the third lower surface 138 or the fourth upper surface 140 can have such release characteristics relative to the layer of adhesive, as to allow the first and second layers of die board material to be separated. Alternatively the adhesive layer can consist of a low-tack adhesive which allows for easy separation of

35 the layers of die board material. Once the layers are separated, the second layer of die board material can then be bonded to the first upper surface 113 defined by the first layer of die board material 134, such that the slots in the first and second layers of die board material are substantially aligned. In this manner, the die board rules 122 when received in the slots 116 are grippingly retained by the first and second

40 layers of die board material 134 and 136 respectively. To facilitate the bonding of the

first and second layers of die board material, a layer of pressure sensitive adhesive 119 can be bonded to the second layer of die board material 136, and can include a layer of release material 137 adhered thereto. Once the layers of die board material are separated, the release material 137 can be peeled from the second layer of die board material, thereby exposing the pressure sensitive adhesive which can then be employed to bond the second layer of die board material to the first upper surface 113.

To ensure proper alignment of the slots 116 between the first and second layers of die board material 134 and 136 respectively, an alignment pin 142 can be pressingly inserted into aperture 144 which is machined into and extends through the die board base prior to the separation of the first and second layers of die board material. While a single alignment pin 142 has been shown and described, the present invention is not limited in this regard as any number of alignment pins can be utilized without departing from the broader aspects of the present invention.

While the present invention has been shown and described as consisting of two (2) layers of die board material, the invention is not limited in this regard as two or more of layers of die board material can be employed, stacked one on top of the other and bonded together without departing from the broader aspects of the present invention. For example, and as shown in FIG. 6, three layers of die board material 134, 136, and 146 can be employed with the slots 116 in the second and third layers of die board material, 136 and 146 respectively corresponding to the second slot sections for grippingly retaining the die board rules 122. The slot 116 in the first layer of die board material 134 corresponds to the first slot section. While the slots 116 have been illustrated as being configured differently between the different layers of die board material, the present invention is not limited in this regard as each of the layers of die board material can include slots 116 having both the first and second slot sections, 18 and 20 respectively as shown in FIG. 1. In addition, each layer of die board material can be made from a different material, such as, but not limited to wood, plastic, or foam.

As shown in FIG. 7, the above-described three layer die board base 112 can be fabricated by providing a die board base wherein the first and second layers of die board material, 134 and 136 respectively are attached to one another as described above and illustrated in FIG. 4. The second layer of die board material 136 includes a fifth lower surface 137 releasably bonded via a layer of adhesive to a sixth upper surface 139 defined by the third layer of die board material 146. Once the slots 116 are cut through the die board base 112, the third layer of die board material 146 can be separated from the second layer of die board material. One of the fifth lower surface 137 or the sixth upper surface 139 has such release characteristics relative to

the other that substantially all of the adhesive remains bonded to one of the layers of die board material.

Alternatively the adhesive can be of the low-tack type thereby providing for easy separation of the second and third layers of die board material.

5 While adhesives have been describes as being employed to bond the layers of die board material together, the present invention is not limited in this regard as fasteners, such as, but not limited to screws, nails, and the like can be substituted without departing from the broader aspects of the present invention.

10 Once the layers of die board material have been separated, the third layer of die board material 146 can then be bonded to the first upper surface 113 of the first layer of die board material 134. A layer of pressure sensitive adhesive 147 can be bonded to the lower surface of the third layer of die board material and includes a layer of release material 139 adhered thereto. Once the second and third layers of die board material are separated, the release material 139 can be peeled
15 from the third layer of die board material, thereby exposing the pressure sensitive adhesive which can then be employed to bond the second third of die board material to the first upper surface 113.

The above-described embodiments of the die boards of the present invention are preferably fabricated using rotary cutting tools. As shown in FIGS. 8-
20 10, various different rotary cutting tools can be employed without departing from the broader aspects of the present invention. As shown in FIG. 8, a first cutting tool 148 is mounted to an apparatus such as a router or a milling machine (not shown), and is used to cut the first slot section 18 into the die board base 12. The first slot section 18 extends from the first upper surface 13 part-way through the die board
25 base 12. A second cutting tool 150 is used to cut the second slot section 20 into the die board base 12. The second slot section 20 extends from the second lower surface 14 and is in communication with the first slot section 18. While FIG. 8 illustrates the use of two rotary cutting tools 148 and 150, the present invention is not limited in this regard as any number of rotary cutting tools can be employed to generate the
30 slots 16.

Alternatively, and as shown in FIG. 9, a single rotary cutting tool 152 can be used to generate the slot 16. The rotary cutting tool 152 is stepped and includes an upper cutting portion 154 defining a first diameter d_1 equivalent to the width w_1 of the first slot section 18, and a lower tip portion 156 defining a second
35 diameter d_2 equivalent to the width w_2 of the second slot section 20. Similarly and as shown in FIG. 10, the single rotary cutting tool 152 can include a tapered region 158 to smoothly transition between the first and second diameters, d_1 and d_2 respectively. The tapered region 158 includes cutting flutes 160 extending about its periphery, such that during a slot cutting operation the cutting tool 152 smoothly
40 and cleanly cuts the slots 16 into the die board base 12. While the die board base has

been illustrated for simplicity in FIGS. 8-10 as being comprised of a single layer, the present invention is not limited in this regard as the die board base 12 can be a laminate comprised of two or more layer of die board material without departing from the broader aspects of the present invention. In addition, while rotary cutting tools have been shown and described, the present invention is not limited in this regard as other type of cutting methods, such as sawing, employing a laser, or utilizing high-pressure water jets can be substituted without departing from the broader aspects of the present invention.

While preferred embodiments have been shown and described, various modifications and substitutions may be made without departing from the spirit and scope of the invention. Accordingly, it is to be understood that the present invention has been described by way of example, and not by limitation.

What is claimed is:

1. A die board for cutting and/or creasing sheet-type work material comprising:

a die board base having a first upper surface, a second lower surface, and at least one slot extending along said first upper surface;

5 said slot having a first slot section extending from said first upper surface at least part-way through said die board base, and a second slot section extending from said second lower surface at least part-way through said die board base; and

10 at least one die board rule pressingly engaged in and grippingly retained by at least one of said first and second slot sections.

2. A die board for cutting and/or creasing sheet-type work material, as defined by claim 1, wherein:

said first and second slot sections each define a width, with said first slot section width being different from said second slot section width.

3. A die board for cutting and/or creasing sheet-type work material, as defined by claim 2, wherein:

5 said die board rule is positioned in said first and second slot sections and defines a tip portion extending from said first upper surface of said die board base for cutting or creasing said work material; and wherein

said first slot section is filled with filler material surrounding a portion of said die board rule positioned therein, to prevent deflection of said die board rule within said first slot section during operation of said die board.

4. A die board for cutting and/or creasing sheet-type work material, as defined by claim 3, wherein said filler material is an epoxy.

5. A die board for cutting and/or creasing sheet-type work material, as defined by claim 2, wherein:

said first slot section defines opposing slot walls; and

5 at least one spacer is positioned in said first slot section in pressing engagement with at least one of said slot walls, and said die board rule to prevent deflection of said die board rule within said first slot section during operation of said die board.

6. A die board for cutting and/or creasing sheet-type work material as defined by claim 1, wherein said die board base is a laminate including:

a first layer of die board material defining a third lower surface, said first slot section extending through said first layer of die board material;

5 at least a second layer of die board material defining a fourth upper surface, said second slot section extending through said second layer of die board material; and

a layer of adhesive interposed between and bonding said third lower surface to said fourth upper surface.

7. A die board for cutting and/or creasing sheet-type work material as defined by claim 6, wherein:

said first and second slot sections each define a width, with said first and slot section widths being different.

8. A die board for cutting and/or creasing sheet-type work material as defined by claim 6, wherein:

said second slot section extends through said second layer of die board material and part-way into said first layer of die board material;

5 said third lower surface and said fourth upper surface have such release characteristics relative to said layer of adhesive that when said first layer of die board material is separated from said second layer of die board material said layer of adhesive remains bonded to said third upper surface leaving said second lower surface substantially free of adhesive; and whereby

10 upon separating said second layer of die board material from said first layer of die board material, said second layer of die board material can be bonded to said first upper surface so that said die board rule extends through and is grippingly retained by said slot in said second layer of die board material and said second slot section in said first layer of die board material.

9. A die board for cutting or creasing sheet-type work material as defined by claim 8, wherein:

said second layer of die board material includes a lower surface having a layer of pressure sensitive adhesive bonded thereto; and

5 a layer of sheet material having release characteristics overlying and adhered to said layer of pressure sensitive adhesive, such that said layer of sheet material can be peeled away exposing said pressure sensitive adhesive which can then be employed to bond said second layer of die board material to said first upper surface.

10. A die board for cutting or creasing sheet-type work material as defined by claim 6, wherein said first and second layers of die board material are wood.

11. A die board for cutting or creasing sheet-type work material as defined by claim 6, wherein said first and second layers of die board material are plastic.

12. A die board for cutting or creasing sheet-type work material as defined by claim 6, wherein one of said first and second layers of die board material is plastic and the other of said layers of die board material is wood.

13. A die board for cutting or creasing sheet-type work material as defined by claim 6, wherein one of said first and second layers of die board material is plastic and the other of said layers of die board material is foam.

14. A die board for cutting or creasing sheet-type work material as defined by claim 6, wherein one of said first and second layers of die board material is wood and the other of said layers of die board material is foam.

15. A die board for cutting and/or creasing sheet-type work material as defined by claim 6 wherein:

said first layer of die board material defines at least one aperture extending therethrough;

said second layer of die board material defines at least one mating aperture extending therethrough and aligned with said aperture in said first layer of die board material; and

at least one alignment pin is pressingly positioned in, and extends through said aperture and mating aperture in said first and second layers of die board material.

16. A die board for cutting and/or creasing sheet-type work material as defined by claim 6, further comprising:

said second layer of die board material defining a fifth lower surface;

a third layer of die board material defining a sixth upper surface, said

5 second slot section extending through said third layer of die board material;

a second layer of adhesive interposed between and bonding said sixth upper surface to said fifth lower surface;

said fifth lower surface and said sixth upper surface having such release characteristics relative to said second layer of adhesive that when said third
10 layer of die board material is separated from said second layer of die board material said second layer of adhesive remains bonded to said sixth upper surface leaving said fifth lower surface substantially free of adhesive; and whereby

upon separating said third layer of die board material from said second layer of die board material, said third layer of die board material can be attached to
15 said first upper surface so that said die board rule extends through and is grippingly retained by said slot in said second and third layers of die board material.

17. A die board for cutting and/or creasing sheet-type work material as defined by claim 16, wherein said first, second, and third layers of die board material are wood.

18. A die board for cutting and/or creasing sheet-type work material as defined by claim 16, wherein said first, second, and third layers of die board material are plastic.

19. A die board for cutting and/or creasing sheet-type work material as defined by claim 16, wherein at least one of said first, second, and third layers of die board material is plastic and at least one of the other of said layers of die board material is wood.

20. A die board for cutting or creasing sheet-type work material as defined by claim 16, wherein at least one of said first, second, and third layers of die board material is plastic and at least one of the other of said layers of die board material is foam.

21. A die board for cutting or creasing sheet-type work material as defined by claim 16, wherein at least one of said first, second, and third layers of die board material is wood and at least one the other of said layers of die board material is foam.

22. A method for fabricating a die board for cutting and/or creasing sheet type work material, said method comprising the steps of:

providing a die board base having a first upper surface and a second lower surface;

5 providing an apparatus for cutting at least one slot in said die board base;

presenting said die board base to said apparatus;

operating said apparatus to cut said slot such that said slot includes an upper slot section having a first width and a lower slot section having a second

10 width that is less than the width of the first slot section;

positioning at least one die board rule into said slot, such that said die board rule is grippingly retained in said second slot section.

23. A method for fabricating a die board for cutting and/or creasing sheet-type work material, as defined by claim 22 wherein:

said step of providing an apparatus for cutting at least one slot in said die board base includes providing an apparatus employing at least one rotary cutting
5 tool.

24. A method for fabricating a die board for cutting and/or creasing sheet type work material as defined by claim 22, wherein said die board base includes a first layer of die board material, and at least a second layer of die board material, and wherein:

5 said step of operating said apparatus to cut a slot into said die board base includes, cutting a first slot defining said first slot section through said first layer of die board material, and cutting a second slot through said second layer of die board material, said second slot defining said second slot section; and

10 prior to said step of positioning at least one die board rule into said slot, said method includes the step of bonding said second layer of die board material to said second lower surface of said first layer of die board material, such that said first and second slot sections are substantially aligned.

25. A method for fabricating a die board for cutting and/or creasing sheet type work material as defined by claim 24 wherein said die board base includes a third layer of die board material, and:

- 5 said step of operating said apparatus to cut a slot into said die board base includes cutting a third slot through said third layer of die board material corresponding to said second slot section; and
- 10 said step of bonding said second layer of die board material to said second lower surface of said first layer of die board material, further includes bonding said third layer of die board material to said first upper surface of said first layer of die board material such that said slots in each of said layers of die board material are substantially aligned.

26. A method for fabricating a die board for cutting and/or creasing sheet type work material as defined by claim 23, wherein said die board base includes a first layer of die board material, and at least a second layer of die board material having a third upper surface and a fourth lower surface, said method

5 including the further steps of:

- adhering said third upper surface of said second layer of die board material to said second lower surface of said first layer of die board material;
- 10 said step of providing an apparatus for cutting at least one slot in said die board base, includes employing a rotary cutting tool having an upper cutting portion defining a first diameter, and a lower tip portion defining a second diameter smaller than said first diameter; and
- 15 said step of operating said apparatus to rotatably cut at least one slot into said layer of die board material further includes cutting said slot through said first and second layers of die board material, such that said slot in said first layer of die board material includes a first slot section having a slot width equal to said first diameter of said rotary cutter, and a second slot section having a slot width equal to said second diameter of said rotary cutter, and said slot in said second layer of die board material has a slot width at least equal to said second diameter of said rotary cutter;
- 20 separating said first and second layers of die board material;
- bonding said second layer of die board material to said first upper surface such that said slots in each of said layers of die board material are substantially aligned with one another; and wherein
- 25 said step of positioning at least one die board rule into said slot further includes positioning said die board rule into said slot in said second layer of die board material such that said die board rule is grippingly retained therein and extends therethrough into said slot in said first layer of die board material.

27. A method for fabricating a die board for cutting and/or creasing sheet-type work material, as defined by claim 22 wherein:

said step of providing an apparatus for cutting at least one slot in said die board base includes providing an apparatus employing a laser.

28. A method for fabricating a die board for cutting and/or creasing sheet-type work material, as defined by claim 22 wherein:

said step of providing an apparatus for cutting at least one slot in said die board base includes providing an apparatus employing at least one saw.

29. A method for fabricating a die board for cutting and/or creasing sheet-type work material, as defined by claim 22 wherein:

said step of providing an apparatus for cutting at least one slot in said die board base includes providing an apparatus employing a water jet.

Abstract Of The Disclosure

- In a die board for cutting and/or creasing sheet-type work material, a base is provided that includes a first upper surface and a second lower surface. At least one slot extends along the first upper surface and includes a first slot section
- 5 extending from said first upper surface at least part-way through the die board base. The at least one slot also includes a second slot section extending from said second lower surface at least part-way through the die board base. The first and second slot sections each have a width with at least one of the slot section widths being adapted to grip and retain at least one die-board rule.

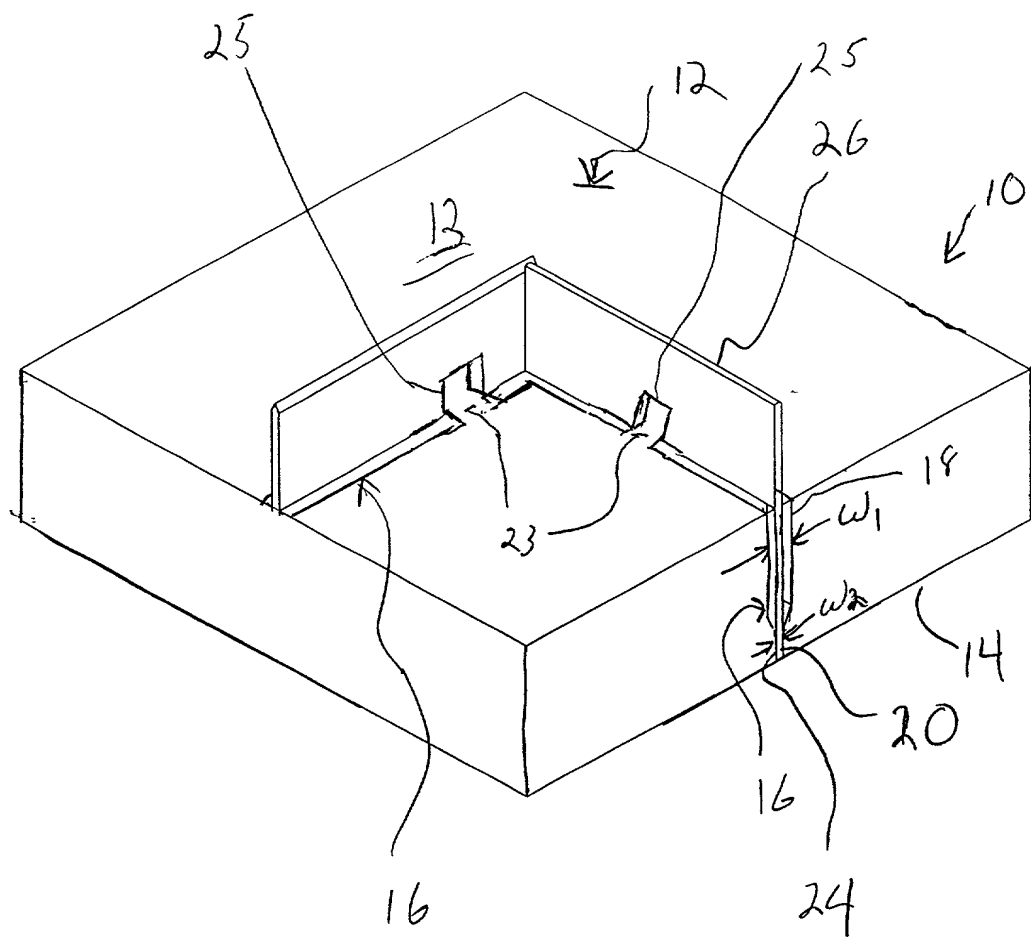


Fig. 1

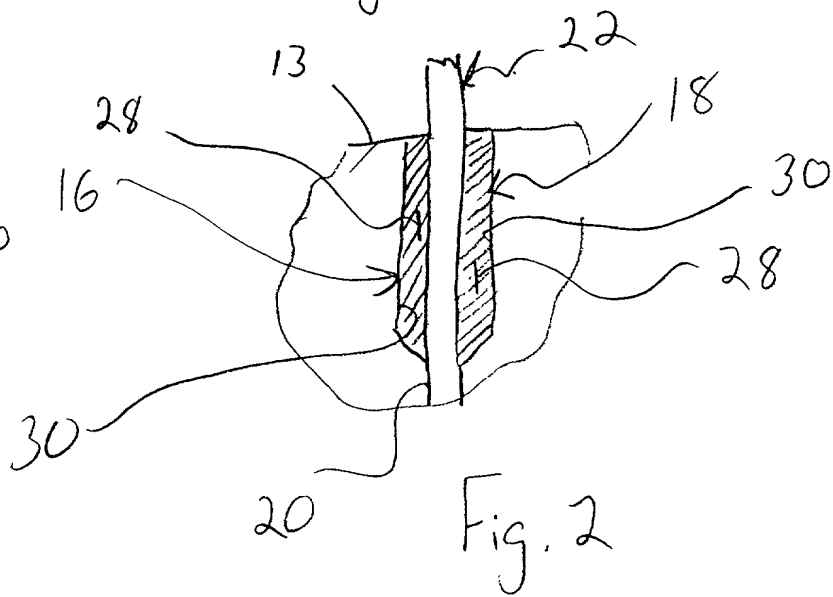


Fig. 2

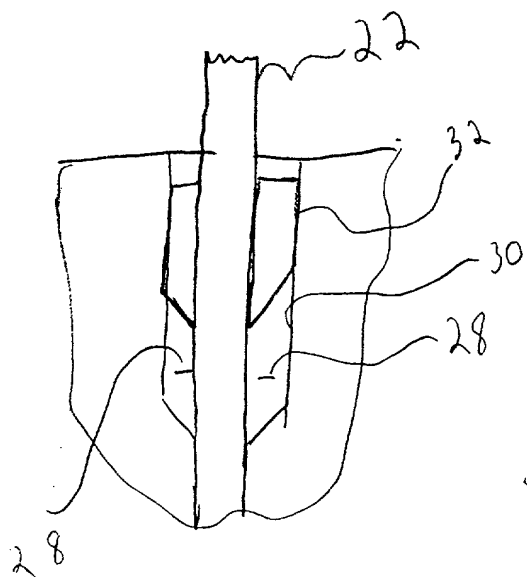


Fig. 3

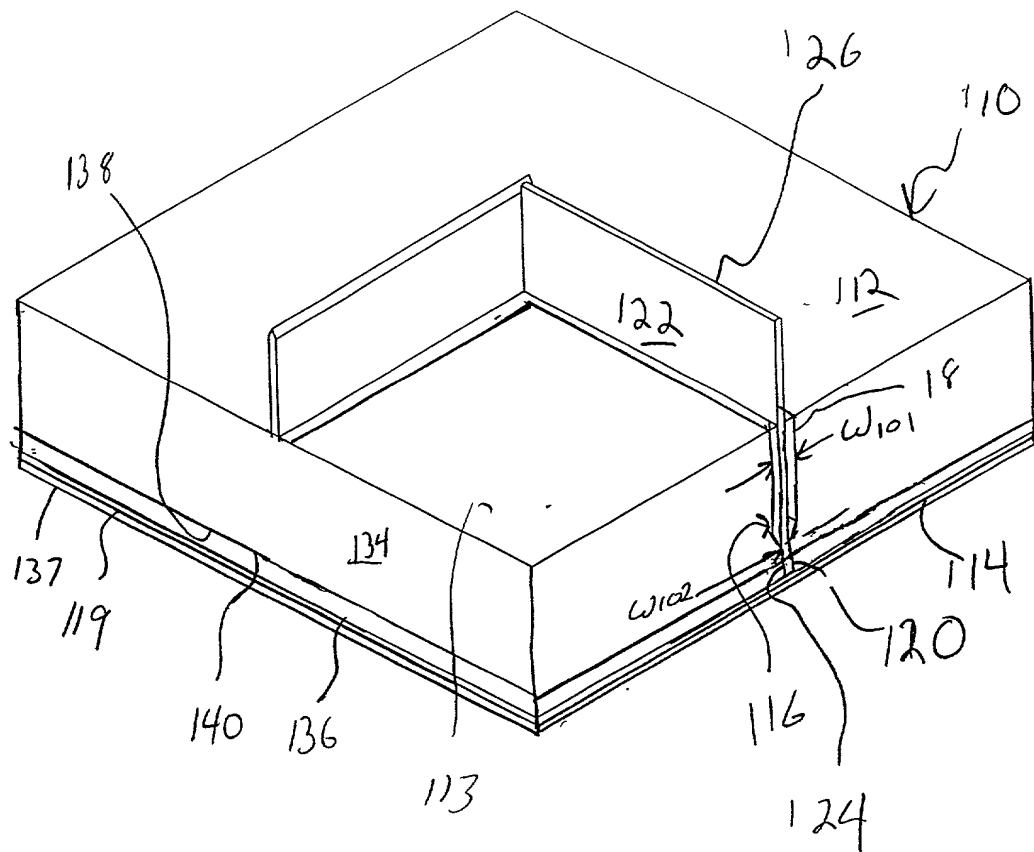


Fig. 4

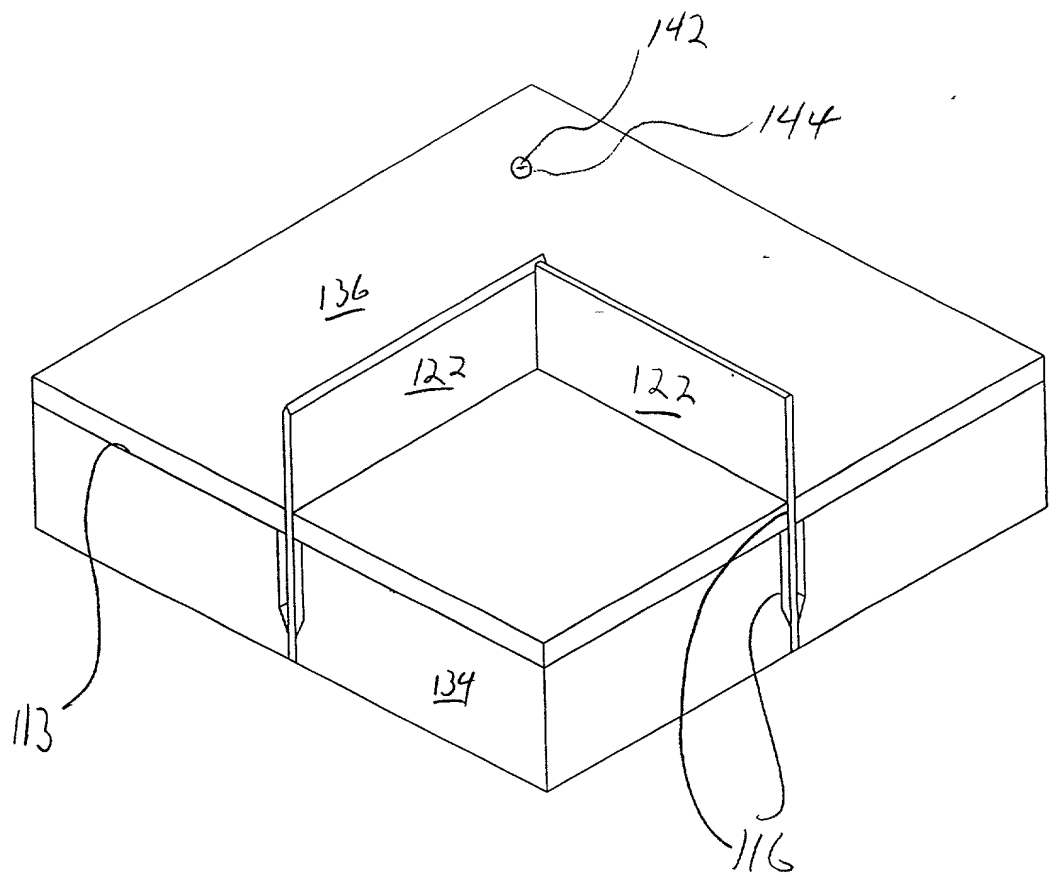


Fig. 5.

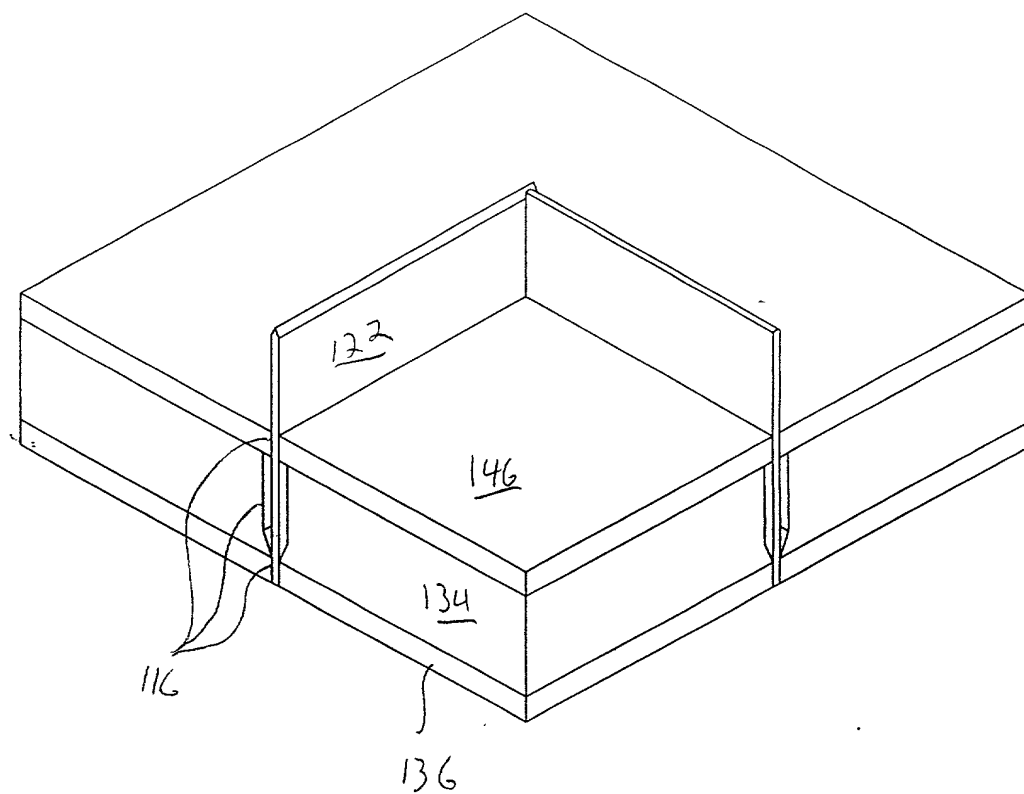
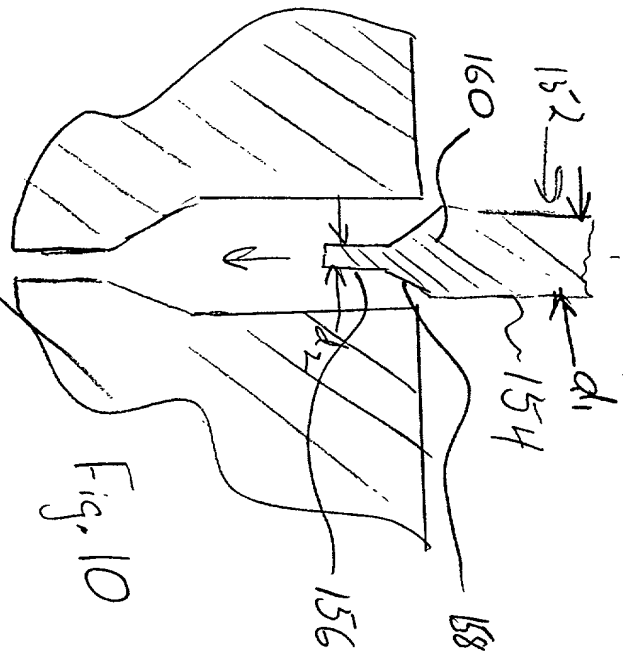
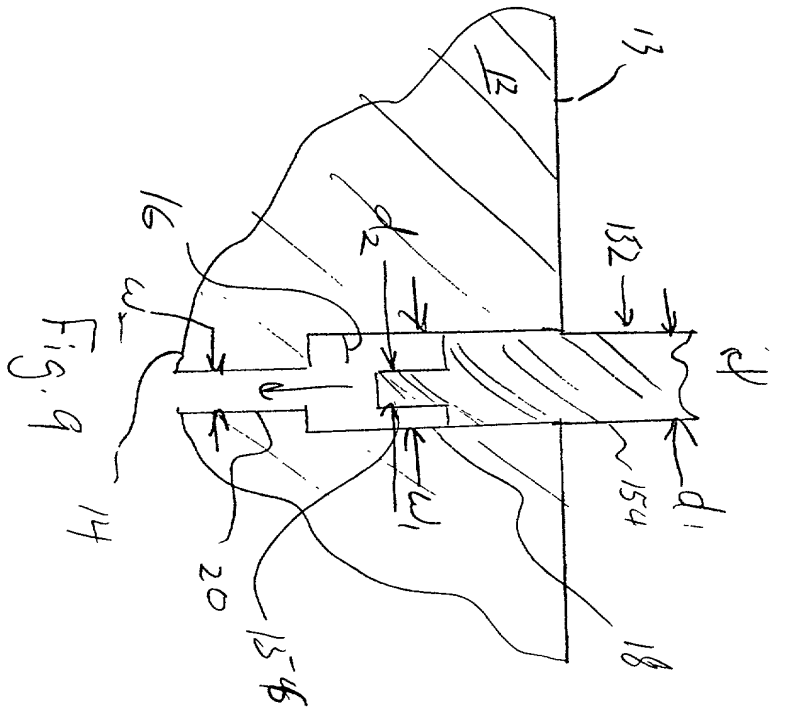
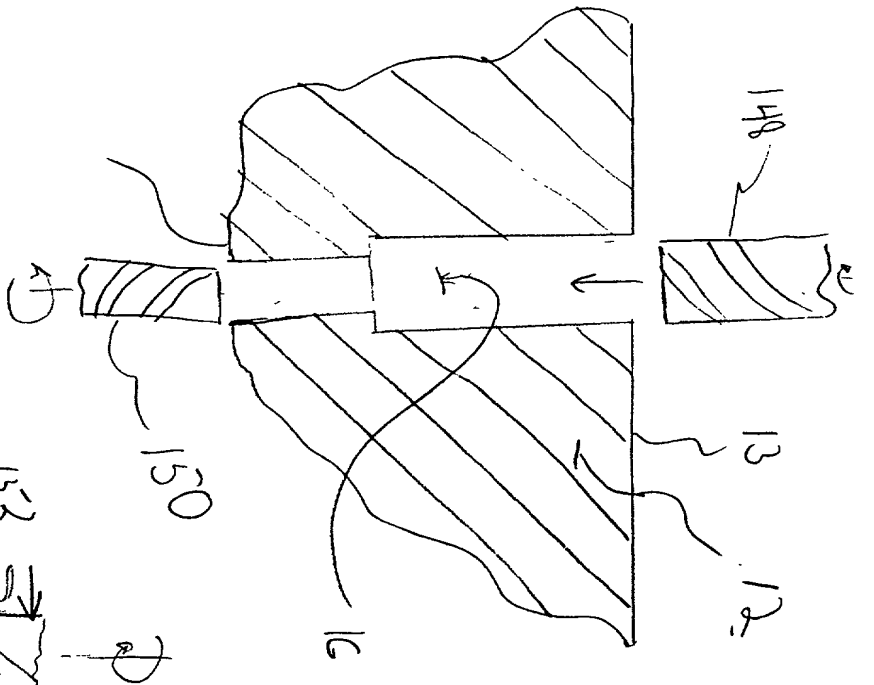


Fig. 6



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of)
)
Strobel et al.)
)
on METHOD FOR MAKING DIE BOARDS,)
AND MATERIALS AND APPARATUS FOR)
PRACTICING THE METHOD)
)
Serial No.: NEW) (Our Docket No. P48-1229-1)
)
Filed: Herewith)

Assistant Commissioner for Patents
Washington, DC 20231

DECLARATION COVER LETTER

S I R:

Enclosed herewith is a copy of the Declaration filed with U.S. Patent
Application No. 09/271,416 which is the parent application of the divisional
application being filed herewith.

Respectfully submitted,

By

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DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled METHOD FOR MAKING DIE BOARDS, AND MATERIALS AND APPARATUS FOR PRACTICING THE METHOD,

(Check _____ is attached hereto.
one)

X was filed on March 17, 1999 as
Application Serial No. 09/271416
and was amended on _____
(if applicable)

We hereby state that we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to be material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56 and 1.63(d).

We hereby claim foreign priority benefits under Title 35, United States Code, 119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
			Yes	No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)		

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States Provisional Application(s) listed below:

			Priority Claimed	
			Yes	No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)		

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 and 1.63(d) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (Filing Date)

(Status) (Patented,
pending, abandoned)

I hereby appoint Theodore R. Paulding, Registration No. 19,294; Donald K. Huber, Registration No. 18,686; John C. Hilton, Registration No. 22,965; Frederick J. Haesche, Registration No. 24,529; John C. Linderman, Registration No. 24,420; J. Kevin Grogan, Registration No. 31,961; Richard R. Michaud, Registration No. 40,088; Daniel G. Mackas, Registration No. 38,541; Peter J. Rainville, Registration No. 41,263; Marina F. Cunningham, Registration No. 38,419; Susan C. Oygard, Registration No. 42,969 and Lawrence Cruz, Registration No. 36,385, all of the firm of McCormick, Paulding & Huber LLP, CityPlace II, 185 Asylum Street, Hartford, Connecticut 06103-4102, telephone (860) 549-5290 as my attorneys to prosecute this application, to make alterations and amendments therein, to receive the patent and all correspondence relating to this application, and to transact all business in the U. S. Patent and Trademark Office connected therewith, and the said attorneys are hereby given full power of substitution and revocation.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Full name of first inventor

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Inventor's Signature

5/17/99

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